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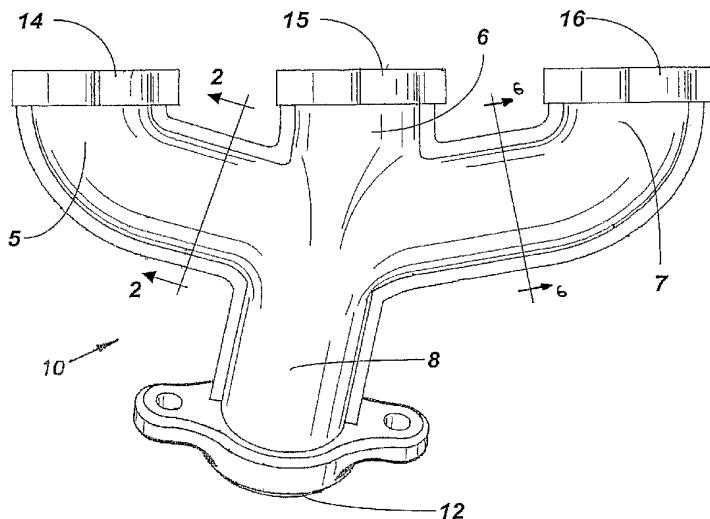
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[Continued on next page]

(54) Title: HIGHLY INSULATED EXHAUST MANIFOLD



(57) Abstract: An exhaust manifold (10, 110) is provided having a ceramic inner layer (22, 32) defining an exhaust gas passageway (20), and a composite insulation zone (24, 26) that is highly thermally insulating. In one embodiment, the composite insulation zone (24) includes a plurality of metallic foils (31, 32) in alternating arrangement with layers having insulating qualities. In the composite insulation zone, the layers having insulating qualities can include ceramic layers (26), evacuated spaces, microsphere layers (37) including substantially evacuated microspheres, or a combination of these. A novel sealing arrangement also is provided for sealing the ceramic inner and metallic outer layers of a metal-encased-ceramic exhaust manifold at a location adjacent the inlet port (14, 15, 16) of a runner of the manifold. A sealing gasket (140) is substantially completely encased within or shielded by the metallic outer layer, so as not to contact the cylinder head (115) when assembled to an internal combustion engine.

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